REMARKS

Reconsideration of this application is respectfully requested. In view of the amendments made herein and the following remarks, the present invention is a control circuit for a pulse width modulated solid state power switch of the type used to connect a DC source to a DC load. In accordance with the invention, a shunt resistor made up of overlying opposite direction parallel resistor traces on opposite parallel surfaces of the circuit board provides inputs to a detector circuit which in turn controls the pulse width modulator which is associated with the switch to vary the duty cycle thereof. Support for the references to pulse width modulation are found in the specification paragraph 5, paragraph 15, and paragraph 17 (specific reference to "duty cycle" of FET).

The objective of the invention is to provide precise timing in a circuit operating at very high speed. This is achieved in part by eliminating the self inductance associated with conventional production resistors.

Claims 1 and 5-10 were rejected under 35 U.S.C. Section 103(a) as unpatentable over Mizuno et al. (U.S. Patent No. 6,011,416) in view of Lee (U.S. Patent No. 6,194,990). Mizuno et al. has replaced Bilotti et al. as the primary reference used in support of the rejection of all of the claims.

Mizuno et al. describes an over current protection circuit. While it has superficial similarity to Applicant's invention, the differences are important. Whereas Applicant's invention senses the voltage drop across a low-Ohm resistor and uses it to trigger the off times of a pulse width modulated switch by way of a control circuit, Mizuno et al. senses voltage, converts it to a digital value and compares it to a set point which shuts down the drive circuit completely if current exceeds a pre-determined limit. In short, Mizuno et al. is an over current prevention circuit, not a high-speed switch circuit of the type described by Applicant. Throughout the specification, Mizuno et al. refers to "an excess-current detection function according to the present invention". This is the essence of the Mizuno et al. disclosure.

Lee et al. discloses a thin film metal resistor with a folded back design using upper and lower traces and current flowing in opposite directions. The circuit of Fig. 11 does not show the resistor traces on opposite faces of a circuit board capable of carrying other components; rather, it discloses resistor traces 34 and 38 on opposite surfaces of "a permanent insulator layer 36 between resistor film 34 and 38 of the multi layer resistor of Fig. 11, such that the dielectric properties of the thick film also preferably remain stable throughout the deposition and photo imaging

processes." While structure 42 is described as a "via," it does not extend through the thick film polymer insulator layer 36.

The Examiner takes official notice that it is well-known in the art that the self-inductance of a shunt resistor adds a time constant which slows down the detection response. From this, the Examiner concludes that it would have been obvious to use the thin film resistor of Lee et al. in the Mizuno et al. circuit. According to the Examiner, the "motivation would be to replace the shunt resistor with a resistor with lower self inductance to improve the response time to a current overload".

It remains the Examiner's obligation to show that the references themselves provide the motivation to combine; In Re Sang Su Lee 277 F.3d 1338 (Fed. Cir. 2001). According to the Federal Circuit, this remains the best defense against combination-of-references rejections prompted by hindsight. Moreover, it is the Examiner's obligation to meet each and every limitation of the claim with the combination of references, not merely to provide a "near miss".

In the present case, there is nothing in Mizuno et al. and Lee et al. to support the substitution of the thin film metal resistor into the excess current protection circuit of Mizuno et al. Mizuno et al. gives no indication that speed of response is a problem requiring the use of special technology such as that described in Lee et al. Excess current detection is typically not an issue based on the instantaneous magnitude of current being generated by a power transistor operating in a pulse width modulated mode; rather, it is a function of growth in the average output current of the power transistor taken over a number of duty cycles.

This takes us to the second point; the combination of Mizuno et al. and Lee et al. does not meet all of the terms of the claim. Claim 13 specifically states that the invention is used in connection with a power transistor operating in a pulse width modulation mode, that the resistor traces are placed on opposite sides of a "circuit board" and that the traces are joined by means of a conductive connection through the board. The two references meet none of these limitations; i.e. Mizuno et al. is an over current protection circuit which shuts the switch off entirely; Lee et al. mounts the metal traces of the resistor on a "permanent insulator" and does not show a conductive connection for the traces which goes through the circuit board. To sum it up, the basic application of the prior art is different from what is claimed and the basic implementation of the prior art is different from what is claimed. The Examiner's "official notice" is both inappropriate and incomplete and reconsideration is respectfully requested.

Regarding claims 6, 7, and 10, novelty is not premised on the mere fact that there is a duplication of parts. The case law cited by the Examiner on page 4 of the Office Action, interesting as it may be, does not carry the rejection for the reason that the underlying independent claims have not been shown to be obvious from the combination of references cited. Reconsideration of this rejection is also requested.

With respect to claim 8, Applicant does not rely entirely on the proposition that the load is a motor; i.e., there is more to the novelty and non-obviousness of the combination of claim 8 than this characteristic as argued above. Reconsideration of the rejection of claim 8 is also requested.

The rejection of claims 2-4, 11, and 12 is also premised on Mizuno et al. in view of Lee et al. and further in view of Bilotti et al. (U.S. Patent No. 5,457,364). The references to such details as the comparator is not relied on to distinguish these claims from the prior art. All of the claims now make reference to the fact that this is a pulse width modulation application, a characteristic which is not found in either of the Mizuno et al. and Lee et al. references.

For the record, Applicant wishes to recognize that Bilotti et al. does disclose a bridge circuit for a motor in which a pulse width modulator 54 is used as input for the bridge control logic 32. However, the disclosure, including the timing wave form shown in Figure 2, of Bilotti et al. provides no indication that fast response in a switching circuit which might otherwise be burdened with the inductance of a conventionally constructed shunt resistor is a problem. The Bilotti et al. circuit, as argued in response to the previous Office Action, is directed toward a totally different problem in a non-analogous technology. As explained in In Re Sang Su Lee, the fact that elements or components of technology used in constructing an invention may be found individually in the prior art has nothing to do with patentability issues under 35 U.S.C. Section 103 absent the expression of a clear motivation in the references themselves to put together the invention as claimed in the application under examination. In this instance, the prior art simply does not provide that explanation and the Examiner can not supply it through "official notice" however tempting it may be to do so.

It is respectfully submitted that this Amendment traverses and overcomes all of the Examiner's objections and rejections to the application as originally filed. It is further submitted that this Amendment has antecedent basis in the application as originally filed, including the specification, claims and drawings, and that this Amendment does not add any new subject matter to the application. Reconsideration of the application as amended is requested. It is respectfully

submitted that this Amendment places the application in suitable condition for allowance; notice of which is requested.

If the Examiner feels that prosecution of the present application can be expedited by way of a telephone conference, the Examiner is invited to contact the Applicant's attorney at the telephone number listed below.

Respectfully submitted,

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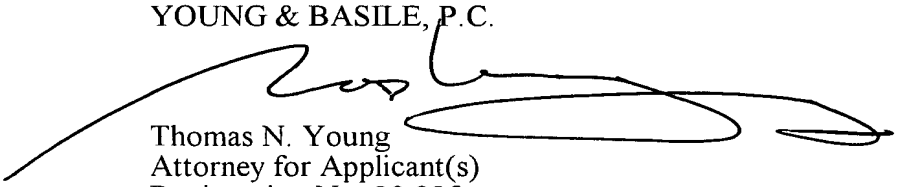

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